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What Works? Research into Practice

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How can teachers ensure that boys and girls have equal opportunity to work with and benefit from computers?

Research Tells Us

- Male dominance is still prevalent with respect to computer attitudes, ability, and use.
- Girls begin to develop increasingly negative attitudes as they reach Grades 7 and 8.
- In middle school boys report higher use of computers than their female classmates and significantly higher use by Grade 8.
- There is a strong relationship between confidence and computer ability in older students and in adults.

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Research Monograph # 8

Gender Differences in Computer Attitudes, Ability, and Use in the Elementary Classroom

By Dr. Robin Kay

Computers are integrated into almost every major area of our lives: art, education, entertainment, business, communication, culture, media, medicine, and transportation. Many children start interacting with computers at three or four years of age; gender-based socialization begins even earlier, at the moment when someone asks, "Is it a boy or a girl?". A critical question arises as to whether computer behaviour is influenced by gender. If computers play an increasingly prominent role in our society, one could argue that significant power and success rest with those who know how to use this technology effectively. It is vital that boys and girls have equal opportunity to work with and benefit from computers.

Synopsis of the Research Literature

In 1992, I reviewed 36 studies on gender and computer-related behaviours.¹ The overall picture indicated that males had more positive attitudes and higher abilities, and that they used computers more. Five years later, a detailed study by Whirley² revealed that gender imbalances continued to exist with respect to computer attitudes. Males viewed computers as primarily masculine tools, had stronger computer skills, and more positive feelings about computers. More recent literature reviews³⁻⁵ show that male dominance is still prevalent with respect to computer attitudes, ability, and use. A majority of this research, though, looks at teens and adults.

Computer games. Many girls in elementary school are less confident than boys with respect to computers.⁶⁻⁸ Some have argued that a majority of computer games are designed for boys, thereby promoting their increased confidence.⁹⁻¹¹ Others have noted that elementary teachers, who are predominantly female, are role models for young students. If these teachers are not confident and competent computer users, it could have a significant impact on girls' and boys' perceptions.¹²

It is worth noting that gender differences in computer attitudes increase with age. While there is relatively little difference between boys and girls up to Grade 4, girls begin to develop increasingly negative attitudes as they reach Grades 7 and 8.¹³

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Computer ability: It is somewhat surprising that existing research does not address differences in computer ability between boys and girls in elementary school. To date, no formal research has been done for this age group. Research on computer ability for older students and adults indicates that there is a strong relationship between confidence and computer ability.²²⁵ Males, who are typically more confident than females,^{226,27} rate themselves significantly higher in computer ability than do females. One might speculate that there is a similar relationship between computer confidence and ability for elementary boys and girls, although more research is needed to support this theory.

Computer use: While computer attitudes differ between boys and girls, it is their computer use that is most important. In other words, does the greater computer confidence of boys in Grades 5 to 8 translate into increased use of computers? The answer is an emphatic yes.

There is considerable evidence to suggest that boys use computers more than girls; this difference, like computer attitude, only emerges in middle school. In one study of 6,800 students, computer use by boys and girls in the fourth grade was about equal, but by the eighth grade, boys reported significantly higher use.²⁸ The findings of this report are supported by a number of large-scale literature reviews.^{29,30}

Boys, Girls, and Computer Use

It is more interesting, and perhaps more helpful, to note how boys and girls use computers, as well as how they behave while in these situations. The following observations have been made:

- Boys use computers more frequently than girls at their homes, their friends' homes, summer camps, and after-school clubs.
- Boys use computers to play games, use educational software, and access the Internet, whereas girls use computers for email, instant messaging, and homework.^{31,32}
- Boys tend to be more assertive and dominant about computer use and girls tend to be more passive.³³
- Teachers let girls give up more easily than boys when solving computer-related problems.³⁴
- Girls appear to prefer to use computers for goal-oriented activities with meaningful contexts.³⁵
- Girls like co-operative learning based on inquiry and diversity of topics.³⁶

Implications for Practice

Strategies to Address Gender Difference

There are a number of strategies that an elementary teacher can use to address gender differences in computer attitude and use. The following suggestions are offered:

Developing positive attitudes and use: It is important for teachers to establish a clear set of rules and behaviours for using computers. A co-operative, supportive atmosphere needs to be emphasized. Simple rules like "never touch the mouse of another student while he or she is using the computer" will reduce opportunities for a student to take over or dominate a computer-based activity. In addition, computer time must be monitored closely. Finally, girls should be encouraged not to give up too quickly; teachers should offer thoughtful support and hints instead of doing the task for them.

Create same-sex groups: There is some research to suggest that girls in same-sex classrooms behave more positively toward computers.²⁰ One way to limit aggressive, dominating behaviour by boys is to create same-sex computer study/use groups.

Be sensitive to differentiated learning: It is important to understand that boys and girls may have different learning styles when it comes to computers. Rather than looking for a gender-neutral solution, we should seek ways to validate different views of technology. Practically speaking, this means that a variety of activities needs to be encouraged: working in pairs to address a problem; using computers in a wide range of contexts; and allowing for creativity in projects, so that boys and girls can pursue tasks that interest them.

Integrated meaningful use: It does little good to promote computer-related activities if teachers are not sensitive to the experiences and interests of girls.²¹ The American Association of University Women²² adds that girls are often more interested in using computers to complete personally meaningful tasks. For example, a WebQuest (see <http://www.webquest.org/> for examples) is an ideal activity that encourages collaboration to solve authentic, real-world problems. Activities that encourage students to be resourceful and construct their own knowledge should be promoted.

In addition, computers should be integrated into a variety of contexts and subject areas. Focusing on a curriculum that emphasizes learning specific computer skills out of context may discourage girls from using computers. Most researchers and educators would agree that using computers to solve problems throughout the elementary curriculum is a wise strategy, regardless of gender.

Finally, the common practice of using computers as a reward, or for "free time," should probably be discouraged, because it tends to promote more aggressive and assertive behaviour from boys. Some girls may back off and defer to more self-confident boys.²³ Structured, well-planned activities are essential to address gender differences effectively.

Empower confident elementary teachers: It is important that elementary teachers become capable enough to design effective computer-based lessons. Without the confidence and ability to use computers in an educational setting, it will be hard for teachers to design effective computer-based lessons or to guide meaningful computer use.²⁴ In addition, gender perceptions will never change unless female teachers demonstrate that they are capable users of technology.

Unfortunately, while elementary school teachers recognize the value of becoming more computer savvy, the time needed to gain the confidence and skill is hard to find. Fortunately, there are at least two types of activities that are easy to learn, which can be used for a wide range of subjects. In addition to the previously mentioned WebQuests, there are web-based learning objects, small, easy-to-use programs that help students learn a specific concept. (See <http://education.mont.ca/londee/> for many good collections.)

Use gender-neutral software: Most software programs for elementary school students in Ontario are gender neutral. Web-based games and activities, however, need careful screening. Avoid software with excessive competition or any kind of violence. This kind of software does little to inspire girls and often distracts boys.

Encourage different: We must improve the ways in which elementary teacher candidates are prepared to use technology.²⁵ Furthermore, new teachers need to know "how to create an innovative, engaging, and equitable learning environment" (American Association of University Women, 2000, p. 1). Key elements of an effective technology program in education include good access to software and hardware; modeling, constructing real activities that could be used in a classroom; and collaboration among teacher candidates, faculty, and mentor teachers.

To Improve Girls' Computer Confidence

- Encourage girls to persevere with computer-related problems by offering thoughtful support.
- Monitor computer time to prevent any student dominating an activity and to ensure girls have equal time on task.
- Create co-operative learning activities (same-sex groups, working in pairs, interest-based tasks) sensitive to the experiences and preferences of girls.
- Provide structured computer-based activities across the curriculum to address gender differences effectively.



In Sum

For the past 25 years, persistent gender differences in computer attitudes, ability, and use have been observed. These observations indicate that males (age 18 and older) have the advantage. More recent research^{11,12} indicates that these results also apply to students in Grades 5 through 8, but there are strategies to help teachers address these gender differences. Ultimately, we want all students to develop an "ability to adapt to rapid changes, interpret critically the wealth of electronic information, [and] experiment without fear" (American Association of University Women, 2000, p. v).³

References

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